MA 35 P (88)-1

Pumps and Compressors

1988

U.S. Department of Commerce
BUREAU OF THE CENSUS

MA35P(88)-1
Issued November 1989

SUMMARY OF FINDINGS

In 1988, manufacturers' shipments of pumps and compressors totaled $3,933.7 million, an increase of 8 percent from the 1987 figure of $3,655.1 million. The 1988 total includes industrial pumps, $1,740.2 million, an increase of 4 percent from the 1987 total of $1,677.4 million; compressors and vacuum pumps, $1,433.3 million, an increase of 12 percent from the 1987 total of $1,280.0 million; domestic water systems, $304.6 million, an increase of 13 percent from the 1987 total of $268.9 million; and other pumps, $455.6 million, an increased of 6 percent from the 1987 total of $428.7 million.

A description of the survey methodology and related information appears on page 8.

Table 1. VALUE OF SHIPMENTS OF PUMPS AND COMPRESSORS BY CLASS OF PRODUCT 1980 TO 1988

(In millions of dollars)

Product code	Product description	1988	1987	1986	1985	1984	1983	1982	1981	1980
3561 pt. 3563 pt.	Pumps and compressors[1]	[2]3,933.7	[2]3,655.1	4 505.7	4,919.4	5,006.2	4,597.0	5,387.9	6,073.1	5,267.4
35611	Industrial pumps	1,740.2	1,677.4	1,632.3	1,724.2	1,753.3	1,749.0	1,893.3	2,047.9	1,909.6
35617,8	Hydraulic fluid power pumps and motors[3]	(2)	(2)	881.6	861.0	852.4	684.3	648.2	846.0	666.5
35613	Domestic water systems	304.6	268.9	272.0	250.6	264.8	237.1	234.5	241.1	228.7
35615 pt.	Oil well, oilfield, and other pumps (including laboratory pumps)	455.6	428.7	451.7	627.4	673.1	639.3	1,007.6	1,147.2	877.7
35631	Compressors and vacuum pumps[3]	1,433.3	1,280.0	1,268.1	1,456.2	1,462.6	1,287.3	1,604.3	1,790.9	1,584.9

pt. Part.

[1]Excludes hand pumps, automotive circulating pumps, compressors for icemaking and refrigeration equipment, air-conditioning units, measuring and dispensing pumps, paint spraying equipment, hydraulic fluid power pumps for passenger automobile power steering units, and replacement and repair parts for pumps and compressors.

[2]Beginning in 1987, product codes 35617 and 35618 changed to 35941.

[3]Beginning in the year 1981, data for hydraulic fluid power pumps and motors, and pneumatic (air) motors are collected annually on the survey MA35W, Fluid Power Products, Including Aerospace.

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Jack Matthews, (301) 763-1462.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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Table 2. COMPARISON OF VALUES OF SHIPMENTS OF PUMPS AND COMPRESSORS, AS REPORTED IN THE MA35P, THE 1987 CENSUS OF MANUFACTURES AND THE 1986 ANNUAL SURVEY OF MANUFACTURES

(Value in thousands of dollars)

Product code	Product description	1987		1986		
					Annual Survey of Manufactures	
		MA35P	Census of Manufactures[P]	MA35P	Value	Standard error of estimate[1]
3561	Pumps and pumping equipment	(X)	3,499.1	(X)	4,688.5	2
35611	Industrial pumps, except hydraulic fluid power	1,677.4	1,698.8	1,632.3	1,693.3	3
35617[2]	Hydraulic fluid power pumps, motors, and hydrostatic transmission components (except aerospace types)[3]	[4]	[6]	721.1	735.7	2
35618[2]	Aerospace type hydraulic fluid power pumps and motors (excluding integral hydrostatic transmission and constant speed drives)[3]			160.5	150.7	11
35613	Domestic water systems and pumps	268.9	310.0	272.0	262.8	15
35615	Pumps and pumping equipment n.e.c.	428.7	459.3	451.7	522.0	6
3561B[5]	Parts and attachments for pumps and pumping equipment, except for hydraulic fluid power, and air and gas compressors	[6]	829.7	[6]	955.3	4
3561A[2]	Parts and attachments for hydraulic fluid power pumps, motors and hydrostatic transmissions, except aerospace type	[7]	[7]	134.9	145.1	4
3561B[2]	Parts and attachments for aerospace type hydraulic fluid power pumps and motors			61.9	46.7	20
35610 00	Pumps and pumping equipment not specified by kind, typically for companies with 5 employees or more	[6]	121.0	[6]	156.8	3
35610 02	Pumps and pumping equipment not specified by kind, typically for companies with less than 5 employees	[6]	80.3			
3563	Air and gas compressors	(X)	2,600.1	(X)	2,712.9	3
35631	Air and gas compressors, except refrigeration compressors, and vacuum pumps	1,280.0	1,223.3	1,268.1	1,311.9	4
35631 30	Air and gas compressors	1,119.0	1,037.4	918.3	(NA)	(NA)
35631 20	Vacuum pumps	117.1	124.0	102.5	(NA)	(NA)
35631 00	Air and gas compressors, n.s.k.	[6]	61.9	(X)	(X)	(X)
35632	Parts and attachments for air and gas compressors, except refrigeration compressors	[6]	529.2	[6]	523.7	3
35635	Industrial spraying equipment	[6]	669.3	[6]	815.8	6
35630 00	Air and gas compressors, not specified by kind, typically for establishments with 5 employees or more	[6]	130.6	[6]	61.6	14
35630 02	Air and gas compressors, not specified by kind, typically for establishments with less than 5 employees	[6]	47.8			

Note: In the 1987 Census of Manufactures, shipments data for establishments of small companies, typically those with fewer than five employees, were estimated from administrative records data rather than collected on census questionnaires. These shipments are included in product codes 35610 02 and 35630 02. Products not adequately identified by detail product were coded in some cases to the appropriate industry (four-digits) followed by "000".

N.e.c Not elsewhere classified. (NA) Not available. N.s.k. Not specified by kind. (X) Not applicable.

[1]The annual survey of manufactures percentage standard errors shown are the approximate relative errors of the estimates of level. A more detailed description of the standard error of estimate is given in the introduction of the annual survey of manufactures, Value of Product Shipments, M86(AS)-2, under "Qualifications of the Data."

[2]During the 1982 Census of Manufactures, old product class 35612, "hydraulic pumps and motors" was reclassified to new product classes 35617, "hydraulic fluid power pumps, motors, and hydraulic transmission components (except aerospace type)," and 35618, "aerospace type hydraulic fluid power pumps and motors (excluding integral hydrostatic transmissions and constant speed drives)." In addition, two new product classes were created for parts sold separately: Product class 3561A, "parts and attachments for hydraulic fluid power pumps, motors and hydrostatic transmissions (except aerospace type)," and product class 3561B, "parts and attachments for aerospace type hydraulic fluid power pumps and motors."

[3]Beginning in the year 1981, data for hydraulic fluid power pumps and motors, and pneumatic (air) motors are collected annually on survey MA35M, Fluid Power Products, Including Aerospace.

[4]Beginning in 1987, product codes 35617 and 35618 changed to 35941.

[5]Previously published as 3561C.

[6]Available only from the annual survey of manufactures and census of manufactures. Most of these data are derived from administrative records. See note above.

[7]Beginning in 1987, product codes 3561A and 3561B change to 35942.

Table 3. QUANTITY AND VALUE OF SHIPMENTS OF PUMPS AND COMPRESSORS: 1988 AND 1987

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1988		1987	
			Quantity	Value	Quantity	Value
	Pumps and compressors	336	14,975,178	3,993,718	14,008,234	3,655,090
35611 --	Industrial pumps	200	4,969,242	1,740,188	4,560,800	1,677,372
35611 98	Value of drivers (reported separately)[1]	142	(X)	334,941	(X)	r314,897
	Reciprocating pumps	(X)	236,009	94,845	230,918	97,299
35611 01	Direct-acting steam-driven	5	57	1,732	93	1,642
35611 03	Power operated, other than steam	42	235,952	93,113	230,825	95,657
	Turbine pumps, vertical (including deep-well)	(X)	29,865	142,074	27,695	132,086
35611 05	Submersible, over 5 hp	18	12,103	37,839	10,458	35,439
	Other than submersible:					
35611 09	16" diameter bowl size and under	17	17,064	91,955	16,582	84,867
35611 10	Over 16" diameter bowl size	7	698	12,280	655	11,780
	Centrifugal pumps	(X)	3,444,106	900,253	3,141,666	858,400
	Submersible centrifugal pumps (except submersible sump pumps):					
	Submersible effluent pumps (less than 1" solids handling capacity):					
35611 83	4-3/4 hp	13	69,258	7,667	r52,954	r8,393
35611 84	1 hp. and over	9	12,848	6,012	r14,384	r8,481
	Submersible solids handling pumps (solids 1" to 2" inclusive):					
35611 85	1/3 to 1/2 hp	11	140,051	24,122	103,967	18,971
35611 86	3/4 hp. and over	12	33,378	9,240	12,011	5,198
	Submersible nonclog pumps (greater than 2" solids handling capacity):					
35611 87	3" discharge outlet and under	13	12,127	5,925	10,364	4,833
35611 88	4" to 6" discharge outlet	15	9,324	13,988	9,381	14,131
35611 89	7" and 8" discharge outlet	8	264	1,318	175	880
35611 90	9" to 12" discharge outlet	5	93	818	93	801
35611 91	Over 12" discharge outlet	2			-	-
	Single stage, single suction, close coupled:					
35611 11	1/2" discharge outlet and under	11	83,712	4,535	r79,594	r4,463
35611 12	3/4" and 1" discharge outlet	40	219,432	24,986	213,829	25,539
35611 14	1-1/4" and 1-1/2" discharge outlet	58	488,427	53,083	473,885	56,226
35611 15	2" and 2-1/2" discharge outlet	56	130,999	39,227	101,251	36,945
35611 16	3" and 4" discharge outlet	53	34,553	28,117	r30,734	24,863
35611 19	Over 4" discharge outlet	37	5,034	14,197	r6,526	r15,288
	Single stage, single suction, frame mounted:					
35611 21	1/2" discharge outlet and under	8	179,882	13,114	173,690	13,548
35611 22	3/4" and 1" discharge outlet	45	296,919	35,668	283,406	34,053
35611 23	1-1/4" and 1-1/2" discharge outlet	53	33,823	32,980	36,883	31,318
35611 24	2" and 2-1/2" discharge outlet	56	36,530	47,101	34,115	40,409
35611 25	3" discharge outlet	58	24,556	39,612	22,940	32,337
35611 26	4" to 6" discharge outlet	55	26,058	62,198	24,847	57,913
35611 29	Over 6" discharge outlet	37	4,670	43,096	3,801	32,850
	Single stage, double suction:					
35611 42	Under 4" discharge outlet	23	7,705	11,554	7,146	8,948
35611 44	4" and 5" discharge outlet	24	5,730	17,760	6,333	18,739
35611 46	6" and 7" discharge outlet	21	4,564	20,668	4,812	16,234
35611 48	8" to 12" discharge outlet	23	4,426	23,131	5,566	22,470
35611 49	Over 12" discharge outlet	17	432	14,812	362	17,753
	Multistage (single or double suction):					
35611 52	1-1/2" discharge outlet and under	24	25,143	13,567	25,594	14,210
35611 54	2" and 3" discharge outlet	23	5,543	27,411	4,438	25,591
35611 56	4" and 5" discharge outlet	16	805	14,952	754	19,528
35611 58	6" and 7" discharge outlet	11	430	9,164	165	5,573
35611 59	8" and over discharge outlet	8	380	9,771	121	6,533
	Propeller and mixed flow:					
35611 62	20" and under	19	1,994	25,193	1,694	14,808
35611 64	Over 20"	16	429	20,984	358	r16,962
	All other centrifugal pumps (including can, etc.):					
35611 65	1-1/2" discharge outlet and under	27	1,450,031	58,025	1,271,710	56,010
35611 66	2" to 6" discharge outlet	26	91,696	36,478	121,827	38,422
35611 69	Over 6" discharge outlet	10	2,860	89,779	1,945	109,179
	Rotary pumps	(X)	904,164	160,295	826,003	170,600
	100 P.S.I. and under designed pressure:					
35611 70	10 G.P.M. and under, designed capacity	25	476,553	36,796	413,474	31,999
35611 71	11 to 99 G.P.M., designed capacity	21	175,746	33,575	r169,778	r34,507
35611 72	100 to 299 G.P.M., designed capacity	12	6,797	7,454	6,855	8,381
35611 73	300 G.P.M. and over, designed capacity	13	3,505	6,339	3,203	5,137
	101 to 250 P.S.I., designed capacity:					
35611 74	10 G.P.M. and under, designed capacity	11	138,774	18,267	125,880	15,570
35611 75	11 to 99 G.P.M., designed capacity	16	36,582	21,346	39,082	33,820
35611 76	100 G.P.M., and over, designed capacity	12	14,530	17,825	16,014	21,404
	251 to 500 P.S.I., designed pressure:					
35611 77	10 G.P.M. and under, designed capacity	7	44,917	4,132	44,982	4,571
35611 78	11 G.P.M., and over, designed capacity	9	4,922	11,095	4,918	10,478
35611 79	Over 500 P.S.I., designed pressure	8	1,838	3,466	1,817	4,733
35611 81	Diaphragm pumps, all types	20	312,117	84,461	274,455	78,939
35611 97	Other industrial pumps, not elsewhere classified	17	42,981	23,319	r59,793	25,151

See footnotes at end of table.

Table 3. QUANTITY AND VALUE OF SHIPMENTS OF PUMPS AND COMPRESSORS: 1988 AND 1987--Continued

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Number of companies	1988		1987	
			Quantity	Value	Quantity	Value
35613 —	Domestic water systems	48	2,007,624	304,649	1,735,666	268,935
35613 13	Jet pump and convertible jet pump systems[2]	19	1,005,536	123,926	835,096	102,427
35613 20	Monjet pump systems (except submersible)[2]	6				
35613 25	Submersible pump systems, 5 hp. and under[2]	20	992,234	179,364	890,147	165,411
35613 70	Domestic hand and windmill pumps, pump jacks, and cylinders (sold separately)[2]	5	9,854	1,159	10,423	1,097
35615 —	Other pumps	(X)	5,753,280	455,578	5,656,866	428,744
35615 98	Value of drivers (reported separately)[1]	21	(X)	71,243	(X)	58,387
	Oil well and oilfield pumps (except boiler-feed)	(X)	168,643	140,046	161,075	126,736
35615 11	Subsurface pumps for oil well pumping	13	160,772	118,700	154,530	97,968
35615 13	Mud pumps (slush pumps)	5	411	9,211	362	10,299
35615 15	Other oil well and oilfield pumps	8	7,460	12,135	6,183	18,469
	Domestic sump pumps, 1 hp. and under	(X)	1,653,770	94,704	1,797,281	105,619
35615 73	Pedestal	25	281,829	13,748	330,290	15,422
	Submersible	(X)	1,371,941	80,956	1,466,991	90,197
35615 77	1/3 hp. and under	31	1,300,818	74,177	1,334,724	74,945
35615 78	Over 1/3 hp.	18	71,123	6,779	132,267	15,252
35615 93	Packaged pump units assembled from purchased pumps	-	-	-		
35615 95	Hot water heating circulator pumps	5				
35615 97	Other pumps, except automotive, (include oil burner and appliance pumps, fire engine pumps, laboratory pumps, etc.)	28	3,930,867	149,585	3,698,510	138,002
35631 —	Compressors and vacuum pumps[3]	94	2,245,032	1,433,303	2,054,902	1,280,039
35631 98	Value of drivers (reported separately)[1]	51	(X)	186,782	(X)	r184,115
	Air compressors	(X)	1,745,457	836,530	1,628,176	750,186
	Stationary	(X)	677,890	537,940	636,653	486,703
	Reciprocating, single acting	(X)	540,061	186,491	498,042	168,386
35631 01	1-1/2 hp. and under	19	362,897	38,940	324,384	r37,321
35631 02	Over 1-1/2 hp. to 5 hp.	26	150,659	74,519	r144,623	r67,358
35631 03	6 hp. to 25 hp.	22	25,576	58,745	28,251	r51,970
35631 04	26 hp. and over	14	929	14,287	784	r11,537
	Reciprocating, double acting	(X)	25,774	48,147	28,957	44,558
35631 05	150 hp. and under	9	25,625	32,115	28,849	36,949
35631 06	151 hp. and over	5	149	16,032	108	7,609
	Rotary positive	(X)	110,797	205,940	128,612	196,463
35631 07	Discharge pressure 50 PSIG and under, all hp. sizes	9	91,329	22,217	113,039	30,927
	Discharge pressure of 51 PSIG and over:					
35631 08	150 hp. and under	17	17,686	130,689	13,366	123,738
35631 09	151 hp. and over	8	1,782	53,034	2,207	41,798
	Centrifugal and axial	(X)	1,258	97,362	1,042	77,296
35631 14	50 PSIG and below	5	377	8,024	388	6,719
	51 PSIG and over	(X)	881	89,338	654	70,577
35631 17	350 hp. and under	3	881	89,338	654	r70,577
35631 19	351 hp. and over	5				
	Portable	(X)	1,067,567	298,950	971,523	263,483
35631 29	Under 11 C.F.M.	9	1,047,402	126,888	954,439	120,978
35631 33	11 to 74 C.F.M.	8	4,530	11,406	r2,736	8,104
35631 34	75 to 124 C.F.M.	8	1,476	8,624	2,231	12,548
35631 36	125 to 249 C.F.M.	10	11,330	81,322	r9,524	r68,953
35631 37	250 to 599 C.F.M.	7	1,309	17,276	r1,410	r19,882
35631 38	600 to 899 C.F.M.	7	1,130	34,639	r873	r21,443
35631 39	900 C.F.M. and over	6	390	18,795	r310	r11,575
	Gas compressors	(X)	3,039	226,243	2,841	182,051
	Stationary, centrifugal and axial	(X)	457	78,389	420	75,337
35631 42	Natural gas	6	300	56,918	r241	r40,242
35631 43	All other gases	6	157	21,471	r179	r35,095
	Reciprocating and rotary	(X)	2,582	147,859	2,421	106,714
	Stationary reciprocating:					
	Integral engines:[2]					
35631 46	2,000 hp. and under[2]	4				
35631 47	2,001 to 4,000 hp.[2]	2	296	40,607	185	25,993
35631 48	4,001 hp. and over[2]	2			-	-
	Other than integral engines:					
35631 51	1,000 hp. and under	16	1,886	76,373	r1,779	43,693
35631 53	1,001 hp. and over	4	128	24,243	r102	27,698
35631 56	Stationary rotary positive	6	272	6,636	r355	r9,330
35631 89	Other compressors (including compressor packages)	9	[4]28,633	[4]55,835	[4] r25,353	[4] r46,627
	Vacuum pumps (including laboratory)	(X)	467,903	127,908	398,532	117,060
35631 93	Low vacuum, 29.5 inches mercury vacuum and lower	25	363,062	63,385	308,578	55,712
35631 94	High vacuum 29.6 inches mercury vacuum and over	17	104,841	64,523	89,954	61,348
35631 96	Packaged compressor units assembled from purchased compressors	5	(4)	(4)	(4)	(4)

- Represents zero. r Revised by 5 percent or more from previously published figures. (X) Not applicable.

[1] The value of drivers was reported only at the product class level. For each product line, value figures exclude, except as noted for codes 35613 13-70 and 35631 46-48, the value of drivers (electric motor or prime movers) shipped with that product. The extent to which some respondents may have included the value of drivers with the value of specific pumps or compressors is unknown.

[2] Includes the value of drivers.

[3] Beginning in the year 1981, data for pneumatic (air) motors are collected annually on survey MA35N, Fluid Power Products, Including Aerospace.

[4] Packaged compressor units assembled from purchased compressors are included with other compressors.

Table 4A. SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF PUMPS AND COMPRESSORS: 1988

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Manufacturers' shipments		Export shipments[1,2] Value			Percent exports to manufacturers' shipments		Imports for consumption[1,5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity	Value f.o.b. plant	Quantity	As reported[3]	Estimated producers' value[3,4]	Quantity	Value	Quantity	Value[6]	Quantity	Value	Quantity	Value
	INDUSTRIAL PUMPS													
	Pumps (excluding drivers)	12,375,048	1,986,451	(NA)	356,234	319,672	(NA)	18	14,794,930	291,532	(NA)	1,921,749	(NA)	15
35611 01 35611 03	Reciprocating pumps	216,009	94,845	29,528	14,554	13,052	13	15	126,851	31,561	333,332	111,852	38	28
35611 05 35611 09 35611 10	Turbine pumps[8]	29,865	142,074	7,747	29,420	26,384	26	21	(8)	(8)	(8)	(8)	(8)	(8)
35611 83- 35611 91	Centrifugal pumps--submersible[9]	277,363	69,090	41,074	6,725	6,031	15	10	(NA)	(NA)				
35611 11- 35611 19	Centrifugal pumps--single stage, single suction, close coupled	962,157	164,145	210,478	33,365	29,922	22	20	124,576	20,452				
35611 21- 35611 29	Centrifugal pumps--single stage, single suction, frame mounted	602,438	273,769	19,300	29,484	26,441	3	11	13,995	5,540				
35611 42- 35611 49	Centrifugal pumps--single stage, double suction	22,857	87,925	2,140	5,338	4,787	9	6	55,312	2,702	4,539,632	850,707	35	9
35611 52- 35611 59	Centrifugal pumps--multistage, single or double suction	32,301	74,865	1,339	9,040	8,107	4	28	2,953	1,591				
35611 62- 35611 69	Other centrifugal pumps, including propeller and mixed flow	1,547,010	230,459	209,192	40,557	36,372	14	18	1,382,213	44,678				
35611 70- 35611 79	Rotary pumps[8]	904,164	160,295	76,920	25,023	22,441	9	16	(8)	(8)	(8)	(8)	(8)	(8)
35613 13- 35613 70	Domestic water systems[8]	2,007,624	304,649											
35615 73- 35615 78	Domestic sump pumps, 1 hp. and under[8]	1,653,770	94,704	57,917	8,076	7,243	2	2	43,089,030	185,008	(NA)	959,190	(NA)	19
35615 11- 35615 15	Oil well and oilfield pumps (except boiler feed)[8]	168,643	140,046	28,798	46,669	41,853	17	33						
35615 95 35615 97	Other pumps, including hot water heating circulator pumps[8]	3,930,867	149,585	(NA)	107,983	96,839	(NA)	72						
	COMPRESSORS													
	Compressors (excluding drivers)	1,777,128	1,118,973	(NA)	271,661	243,626	(NA)	24	2,280,605	199,114	(NA)	1,046,426	(NA)	19
35631 01- 35631 04	Air compressors--stationary, reciprocating, single acting	540,060	186,491											
35631 05 35631 06	Air compressors--stationary, reciprocating, double acting	25,774	48,147											
35631 07- 35631 09	Air compressors--stationary, rotary positive	110,797	205,940	89,870	89,990	80,703	13	17	394,664	93,128	982,683	541,078	40	17
35631 14 35631 17 35631 19	Air compressors--stationary, centrifugal and axial	1,258	97,362											
35631 29- 35631 39	Air compressors--portable	1,067,567	298,950	91,211	43,654	39,149	9	15	1,880,500	71,558	2,856,856	326,854	66	22
35631 42 35631 43	Gas compressors--centrifugal and axial	457	78,389	(5)	50,069	44,902	(NA)	57	2,540	18,994	(NA)	47,314	(NA)	40
35631 46- 35631 56	Gas compressors--reciprocating and rotary	2,582	147,859	5,768	87,948	78,872	18	43	2,901	15,434	28,348	131,180	10	12
35631 89	Other compressors (including compressor packages)	28,633	55,835											
	SELECTED PUMPS													
35631 93 35631 94	Vacuum pumps	467,903	137,908	(NA)	78,509	70,407	(NA)	61	(NA)	179,930	(NA)	229,329	(NA)	78

See footnotes at end of table 4B.

Table 4B. SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF PUMPS AND COMPRESSORS: 1987

(Quantity in number of units; value in thousands of dollars)

Product code	Product description	Manufacturers' shipments		Export shipments[1,2]			Percent exports to manufacturers' shipments		Imports for consumption[1,5]		Apparent consumption[7]		Percent imports to apparent consumption	
				Value										
		Quantity	Value f.o.b. plant	Quantity	As reported[3]	Estimated producers' value[3,4]	Quantity	Value	Quantity	Value[6]	Quantity	Value	Quantity	Value
	INDUSTRIAL PUMPS													
	Pumps (excluding drivers)	11,608,813	1,897,677	(NA)	316,486	283,635	(NA)	14	10,902,391	254,945	(NA)	1,836,036	(NA)	14
35611 01 35611 03	Reciprocating pumps	210,918	97,299	18,937	10,018	8,978	8	10	63,555	13,097	275,536	100,378	23	13
35611 05 35611 09	Turbine pumps[8]	27,695	132,086	10,136	24,665	22,105	37	19	(8)	(8)	(8)	(8)	(8)	(8)
35611 10 35611 83- 35611 91	Centrifugal pumps--submersible[9]	193,329	61,688	18,099	4,940	4,427	9	8	(NA)	(NA)				
35611 11- 35611 15	Centrifugal pumps--single stage, single suction, close coupled	905,829	163,324	146,087	25,783	23,107	16	16	134,945	21,368				
35611 21- 35611 29	Centrifugal pumps--single stage, single suction, frame mounted	579,682	242,428	10,957	21,121	18,929	2	9	6,995	4,677	4,224,133	829,031	36	9
35611 42- 35611 49	Centrifugal pumps--single stage, double suction	24,219	84,144	1,209	3,576	3,205	5	4	14,653	2,087				
35611 52- 35611 59	Centrifugal pumps--multistage, single or double suction	31,972	71,435	798	9,645	8,644	3	14	903	1,828				
35611 62- 35611 69	Other centrifugal pumps, including propeller and mixed flow	1,397,534	235,381	248,679	39,462	35,756	18	17	1,360,799	45,198				
35611 70- 35611 79	Rotary pumps[8]	826,003	170,600	74,945	21,076	18,888	9	13	(8)	(8)	(8)	(8)	(8)	(8)
35613 13- 35613 70	Domestic water systems[8]	1,735,666	268,935											
35615 73- 35615 78	Domestic sump pumps, 1 hp. and under[8]	1,797,281	105,619	62,498	8,036	7,202	2	2						
35615 11- 35615 15	Oil well and oilfield pumps (except boiler feed)[8]	161,075	126,736	29,555	45,460	40,741	18	37	4,320,539	166,590	(NA)	906,627	(NA)	18
35615 95 35615 97	Other pumps, including hot water heating circulator pumps[8]	3,698,510	138,002	(NA)	102,704	92,043	(NA)	75						
	COMPRESSORS													
	Compressors (excluding drivers)	1,636,730	978,864	(NA)	208,939	187,251	(NA)	21	1,992,966	159,346	(NA)	929,271	(NA)	17
35631 01- 35631 04	Air compressors--stationary, reciprocating, single acting	498,042	168,386											
35631 05 35631 06	Air compressors--stationary, reciprocating, double acting	28,957	44,558											
35631 07- 35631 09	Air compressors--stationary, rotary positive	128,612	196,463	65,569	72,017	64,542	10	13	348,237	80,913	939,321	495,599	37	16
35631 14- 35631 17	Air compressors--stationary, centrifugal and axial	1,042	77,296											
35631 29- 35631 39	Air compressors--portable	971,523	263,483	89,032	29,460	26,402	9	11	1,641,357	55,496	2,523,848	289,519	65	19
35631 42 35631 43	Gas compressors--centrifugal and axial	420	75,337	(S)	46,201	41,405	(NA)	61	1,159	9,284	(NA)	38,420	(NA)	24
35631 46- 35631 56	Gas compressors--reciprocating and rotary	2,421	106,714	4,091	61,261	54,902	15	40	2,313	13,653	25,896	105,733	9	13
35631 89	Other compressors (including compressor packages)	25,353	46,627											
	SELECTED PUMPS													
35631 93 35631 94	Vacuum pumps	398,532	417,060	(NA)	65,554	58,749	(NA)	56	(NA)	163,325	(NA)	214,831	(NA)	76

(NA) Not available separately. (S) Suppressed. Data did not meet publication standards of the Bureau of the Census.

[1] For comparison of SIC-based product codes with Schedule B export numbers, and TSUSA import numbers, see table 5.
[2] Source: Bureau of Census report EM 546, U.S. Exports.
[3] Excludes the value of drivers.
[4] These values were derived by use of adjustment factors to exclude freight, insurance, and other charges incurred in moving goods to the port of export. This adjustment is made to convert the values to an approximation of the producers' value of exported goods. Current adjustment factors are based on data for 1986 which are published in Exports from Manufacturing Establishments: 1985 and 1986, AR86-1, appendix B. The adjustment factor applicable to this report is 0.8968.
[5] Source: Bureau of Census report IM 146, U.S. Imports for Consumption.
[6] This dollar value represents the c.i.f. (cost, insurance, and freight) value at the first port of entry in the United States plus import duties.
[7] Apparent consumption is derived by subtracting exports from the total of manufacturers' shipments plus imports.
[8] Data for turbine pumps and rotary pumps have been combined with domestic water systems, domestic sump pumps (1 hp. and under), oil well and oilfield pumps, and other pumps for purposes of comparing import shipments with domestic and export shipments.
[9] Import data for submersible centrifugal pumps are included in the single stage, multistage, propeller, and mixed flow centrifugal pumps.

Table 5. COMPARISON OF STANDARD INDUSTRIAL CLASSIFICATION-BASED PRODUCT CODES, SCHEDULE B EXPORT NUMBERS, AND TSUSA IMPORT NUMBERS: 1988

Product code	Product description	Export number[1]	Product description	Import number[2]	Product description
			INDUSTRIAL PUMPS		
			Reciprocating pumps, except oil well and oil field pumps:		
35611 01	Reciprocating pumps	660.9426	Diaphragm	660.9725	Pumps, reciprocating, for liquids
35611 03		660.9427	Other		
35611 05	Turbine pumps, vertical, including deepwell	660.9470	Pumps, turbine, for liquids	*660.9756	Other pumps, for liquids
35611 09					
36511 10					
			Centrifugal pumps for liquids, single stage, single suction, close coupled		
35611 83-91	Centrifugal pumps--submersible[3]	660.9420	Submersible pumps		Centrifugal pumps--submersible[3]
35611 11-19	Centrifugal pumps--single stage, single suction, close coupled	660.9430	Under 2-inch discharge outlet	660.9735	Centrifugal pumps for liquids, single stage, single suction, close coupled
		660.9435	2-inch and over discharge outlet		
			Centrifugal pumps for liquids, single stage, single-suction, frame-mounted		
35611 21-29	Centrifugal pumps--single stage, single suction, frame mounted	660.9440	Under 3-inch discharge outlet	660.9745	Centrifugal pumps for liquids, single stage, single suction, frame mounted
		660.9445	3-inch discharge outlet and over		
35611 42-49	Centrifugal pumps--single stage, double suction	660.9450	Centrifugal pumps, for liquids, single stage, double suction	660.9750	Centrifugal pumps for liquids, single stage, double suction
35611 52-59	Centrifugal pumps--multistage, single or double suction	660.9455	Centrifugal pumps for liquids, multistage, single or double suction	660.9752	Centrifugal pumps for liquids, multistage, single or double suction
35611 62-69	Other centrifugal pumps--including propeller and mixed flow	660.9460	Other centrifugal pumps for liquids	660.9754	Other centrifugal pumps for liquids
			Rotary pumps:		
35611 70	Rotary pumps	660.9466	Roller	*660.9756	Other pumps, for liquids
35611 79		660.9467	Other		
35613 13	Domestic water systems	660.9475	Household water systems, self-contained, hand pumps, and windmill pumps		
35613 70					
35615 73	Domestic sump pumps, 1 hp. and under				
35615 78					
35615 11-15	Oil well and oilfield pumps (except boiler-feed)	660.9415	Oil well and oilfield pumps, for liquids	*660.9756	Other pumps, for liquids
35615 95	Other pumps, including hot water heating circulator pumps	660.9480	Other pumps for liquids		
			COMPRESSORS		
					Stationary air compressors:
					Reciprocating:
				661.1035	1 HP and under
				661.1036	Over 1 HP but not over 6 HP
35631 01	Air compressors--stationary, reciprocating, single acting	661.1251	Air compressors, stationary, 15 hp. and under	661.1037	Over 6 HP but not over 11 HP
35631 04				661.1038	Over 11 HP but not over 26 HP
35631 05	Air compressors-- stationary, reciprocating, double acting	661.1253	Air compressors, stationary, over 15 hp., not over 100 hp.	661.1039	Other
35631 06					Rotary:
35631 07-09	Air compressors--stationary, rotary positive	661.1255	Air compressors, stationary, over 100 hp.	661.1041	Under 30 HP
				661.1042	30-100 HP
				661.1043	Other
				661.1045	Other
35631 14-19	Air compressor--stationary, centrifugal and axial				
					Portable air compressors:
35631 29-39	Air compressors--portable	661.1257	Air compressors, portable	661.1058	Under 20 CFM
				661.1059	Other
35631 42	Gas compressors--centrifugal and axial	661.1263	Compressors other than air, centrifugal and axial	661.1063	Compressors other than air, centrifugal and axial
35631 43					
			Compressors other than air, other, including reciprocating and rotary		Compressors other than air, other, including reciprocating and rotary
35631 46-56	Gas compressors-reciprocating and rotary	661.1265	Not over 250 hp.	661.1065	Not over 250 hp.
		661.1267	Over 250 hp., not over 1,000 hp.	661.1067	Over 250 hp., not over 1,000 hp.
		661.1269	Over 1,000 hp.	661.1069	Over 1,000 hp.
35631 89	Other compressors				
35631 93	Vacuum pumps	661.1500	Other	661.1500	Other
35631 94					

*This product code represents a variety of products.

[1] Source: 1988 Edition Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States

[2] Source: Tariff Schedules of the United States Annotated (TSUSA) 1988.

[3] Export and import data are included in centrifugal single and multistage, propeller and mixed flow pumps.

DESCRIPTION OF SURVEY

Scope of Survey. This survey covers companies engaged in manufacturing industrial pumps, (reciprocating, turbine, centrifugal, and rotary pumps); domestic water systems, including domestic sump pumps; oil well and oilfield pumps; air compressors; gas compressors; and vacuum pumps. Very small firms (generally less than 5 employees) for which 1987 Census of Manufactures data were derived from administrative records of other government agencies are excluded. Excluded from this survey are hand pumps; measuring and dispensing pumps; automotive circulating pumps; hydraulic fluid power pumps; paint-spraying equipment; compressors for ice making, refrigeration equipment, and air-conditioning units; and replacement and repair parts for pumps and compressors. Hydraulic fluid power pumps previously collected in this survey are now collected in Current Industrial Reports series MA35N, *Fluid Power Products, Including Aerospace.*

Survey Methodology. The statistics in this publication were collected by mail on Bureau of the Census annual Form MA35P, Pumps and Compressors. The survey panel includes all known manufacturers of the covered products, except the very small firms excluded from the scope of the survey. Approximately 350 companies are included. No estimate is derived for the small firms excluded from the survey.

Reliability of Data. Survey error may result from several sources: (1) inability to obtain information about all cases in the survey; (2) response errors; (3) definitional difficulties; (4) differences in the interpretation of questions; (5) mistakes in recording or coding the data obtained; and (6) other errors of collection, response, coverage, and estimation for missing data. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is due to imputing data for nonrespondents, for late reporters, and for data which fail logic edits. Missing figures are imputed based on yearly movements shown by reporting firms. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is not precisely known, but is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

Revisions to Previous Period Data. Statistics for previous years may be revised as the result of corrected data from respondents, late reports for which imputations were made as described above, or other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Revisions include changes to prior period data resulting from reconciliation of the results of this survey with the 1987 Census of Manufactures to correct differences in reported data between the two series and to identify and verify new establishments included in the scope of this survey. Table 2 presents a comparison of data from the two series by census product class following the reconciliation.

Adjustment for Price Change. All dollar figures included in this publication are in current dollars; i.e., they have not been adjusted for price change.

EXPLANATION OF TERMS

Quantity and Value of Shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable sales to unaffiliated customers; i.e., the value includes an appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

Pump. A device for raising, transferring, or moving fluids or for attenuating gases by suction or pressure or both.

Driver. An electric motor, or a prime mover, such as steam engine, steam or gas turbine, or internal combustion engine.

Classes of Pumps:

Direct-Acting Steam-Driven. A reciprocating pump and a steam engine built together as a unit. The power to drive the pump is furnished by the steam engine.

Power-Operated, Other Than Steam. A reciprocating pump driven by power from an outside source applied to the crankshaft of the pump.

Types of Pumps:

Single (Simplex) Pump. A reciprocating pump having one liquid piston or its equivalent single or double acting plunger.

Duplex Pump. A reciprocating pump having two liquid pistons or their equivalent single or double acting plungers.

Triplex Pump. A reciprocating pump having three pistons or their equivalent single or double acting plungers.

Multiplex Pump. A reciprocating pump having more than three pistons or their equivalent single or double acting plungers.

Horizontal Pump. A reciprocating pump having the axial centerline of the cylinder or cylinders in a horizontal position.

Vertical Pump. A reciprocating pump having the axial centerline of the cylinder or cylinders in a vertical position.

Vertical Turbine Pumps (Including Deep Well). A submersible pump system, over 5 horsepower. Submersible pump systems, 5 horsepower and under, are included in domestic water systems.

Centrifugal Pumps:

Classes of Pumps:

Centrifugal Pump. A pump in which the pressure is developed principally by the action of centrifugal force. Pumps in this class with single inlet impellers usually have a specific speed below 4200, and with double suction impellers, a specific speed of below 6000. In pumps of this class, the liquid normally enters the impeller at the hub and flows radially to the periphery.

Frame Mounted Pumps. A pump design in which the impeller is mounted on a shaft, held in a bearing frame and coupled to a motor with a flexible coupling.

Close Coupled Pumps. A pump design in which the impeller is mounted on the motor shaft.

Mixed Flow Pump. A pump in which the head is developed partly by centrifugal force and partly by the lift of the vanes on the liquid. This type pump has a single inlet impeller with the flow entering axially and discharging in an axial and radial direction. Pumps of this type usually have a specific speed from 4200 to 9000.

Axial Flow Pump. A pump of this type, sometimes called a propeller pump, develops most of its head by the propelling or lifting action of the vanes on the liquid. It has a single inlet impeller, with the flow entering axially and discharging nearly axially. Pumps of this type usually have a speed above 9000.

Types of Pumps:

Single Stage Pump. A pump in which the total head is developed by one impeller.

Multistage Pump. A pump having two or more impellers acting in series in one casing.

Single Suction Pump. A pump equipped with one or more single suction impellers.

Double Suction Pump. A pump equipped with one or more double suction impellers.

Rotary Pumps. A positive displacement pump, consisting of a fixed casing containing gears, cams, screws, vanes, plungers, or similar elements actuated by rotation of the drive shaft. These pumps are characterized by their close running clearances and the absence of suction and discharge valves.

Domestic Water Systems. Water supply pumps for household and farm use. A pump sold separately as well as a complete system containing driver, tank, and fittings. Includes submersible pump systems 5 hp and under. Submersible pump systems over 5 hp. are reported as vertical turbine pumps. Excluded are irrigation pumps, which are reported under industrial pumps by class and type of pump.

Jet Pump. A pump with built-in jet (ejector) assembly for either shallow or deep well use.

Convertible Jet Pump. A pump with separate jet (ejector) assembly which permits installation as or conversion to either shallow or deep well settings.

Nonjet Pump. An electrical reciprocating piston pump for shallow or deep well use.

Submersible Pump. A pump completely submerged in water (well, pond, reservoir, etc.) which utilizes a series of impellers and diffusers (stages) on a single shaft or a helical rotor positive displacement design propelled by an oilfilled or water-lubricated motor.

Domestic Hand Pumps, Etc.. Hand, windmill, or engine-driven well pumps not electrically powered.

Oil Well and Oilfield Pumps. Included are pumps especially designed for oil well and oilfield applications.

Vacuum Pumps. A device for withdrawing air, gas, or airgas mixtures from piping systems, enclosed vessels, or enclosed spaces, discharging the air to atmosphere, and removing the moisture.

Compressors. Devices for compressing gases, such as air, for motive power or natural gas for the transfer of gas or for the recovery of liquid hydrocarbons.

Stationary Air Compressors. Air compressors intended for permanent installation and which are not typically mobile.

Portable Air Compressors. Air compressors which are mountable on wheels, skids, or motor trucks so as to be typically mobile.

Gas Compressors. Engine-compressor units that generally consist of an integral engine compressor block that houses both the engine and compressor. In such machines, the engine pistons and compressor pistons are mounted on a common crankshaft.

COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; on the other hand, the export and import classification system is more materials oriented. Also, there are a substantial number of imported commodities which have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to the problems mentioned above, there are also the following problems affecting the comparability of the three sets of data.

Valuation. There are different methods of valuation for the three types of data:

- *Domestic Output.* Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.
- *Exports.* Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance and other charges to the export point.

  Estimated producers' values of exports have also been developed. These values more closely approximate the values reported for domestic output because they exclude freight, insurance, and other charges applied from the producing plant to the export point.
- *Imports.* Valued at the first port of entry in the United States. It includes c.i.f. (cost, insurance, and freight), duty, and other charges to the import point.

Duplication in Quantity and Value of Output. Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at fourdigit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

Low-Value Import and Export Transactions. Detailed commodity information is not included for individual export shipments valued at not more than $1,500. Generally, detailed commodity information is not included for individual import shipments valued at not more than $1,000. For textiles and textile products, gloves, footwear, and miscellaneous rubber and plastics products, detailed commodity information is not included for individual import shipments valued at not more than $250. This is believed to have only negligible effects on the statistics for the bulk of the commodities.

Manufacturers' Shipments, Not Specified by Kind. The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

Time Lag Between Output and Exports. There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

"Direct" vs "Total" Commodity Exports and Imports. Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

Used Commodities. With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

Geographic Area of Coverage. Import and export data reflect the movement of merchandise into and out of U.S. foreign trade zones, the U.S. Virgin Islands, and the U.S. customs territory (includes the 50 States, the District of Columbia, and Puerto Rico).

HISTORICAL NOTE

Data on pumps and compressors have been collected by the Bureau of the Census since 1960. Data on hydraulic fluid power pumps and motors formerly collected on this survey are now included in the Current Industrial Report, MA35N, *Fluid Power Products.* Historical data may be obtained from Current Industrial Reports available at your local Federal Depository Library. A list of these libraries may be obtained from the Bureau of the Census regional offices:

Office	Telephone
Atlanta, Georgia	(404) 347-2271
Boston, Massachusetts	(617) 223-2327
Charlotte, North Carolina	(704) 371-6142
Chicago, Illinois	(312) 353-6251
Dallas, Texas	(214) 767-0621
Denver, Colorado	(303) 236-2200
Detroit, Michigan	(313) 226-7742
Kansas City, Kansas	(816) 374-4601
Los Angeles, California	(213) 209-6616
New York, New York	(212) 264-3860
Philadelphia, Pennsylvania	(215) 597-4920
Seattle, Washington	(206) 442-7828

Historical data are also available on microfiche. For further information contact the Bureau of the Census, Data User Services Division, (301) 763-4100.

RELATED REPORTS

The Bureau of the Census publishes the following related reports:

Series	Frequency	Title
Current Industrial Reports		
MQ35D	Quarterly	*Construction Machinery*
MA35D	Annually	*Construction Machinery*
MA35F	Annually	*Mining Machinery and Mineral Processing Equipment*
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MA35M	Annually	*Air-Conditioning and Refrigeration Equipment*
MA35N	Annually	*Fluid Power Products*
MA36H	Annually	*Motors and Generators*
Other Industry Reports		
M3-1	Monthly	*Manufacturers' Shipments, Inventories, and Orders*
(AS)	Annually	Annual Survey of Manufactures (ASM)
(MC)	Quinquennially	Census of Manufactures
Foreign Trade Reports		
EM 546 FT 446	Monthly Annually	*U.S. Exports—Schedule B—Commodity by Country*
IM 146 FT 246	Monthly Annually	*U.S. Imports for Consumption—TSUSA—Commodity by Country*

CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report MA35P	Jack Matthews	(301) 763-1462
Classification Systems Comparability	Francis McCormick (ESD)	(301) 763-1935
Foreign Trade	Trade Data Inquiries Staff (FTD)	(301) 763-5140
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International Trade Administration	Edward McDonald	(202) 377-0680
To order a Current Industrial Report	Superintendent of Documents (GPO)	(202) 783-3238
To subscribe to a Census Bureau publication	Superintendent of Documents (GPO)	(202) 275-3054

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